

***IN THE UNITED STATES PATENT AND TRADEMARK OFFICE***

Applicant: John Deryk WATERS

Title: APPARATUS FOR PRINTING AND MEMORY TAG APPLICATION  
AND METHOD THEREFOR

Appl. No.: Unassigned

Filing Date: October 31, 2003

Examiner: Unassigned

Art Unit: Unassigned

**CLAIM FOR CONVENTION PRIORITY**

Commissioner for Patents  
PO Box 1450  
Alexandria, Virginia 22313-1450

Sir:

The benefit of the filing date of the following prior foreign application filed in the following foreign country is hereby requested, and the right of priority provided in 35 U.S.C. § 119 is hereby claimed.

In support of this claim, filed herewith is a certified copy of said original foreign application:

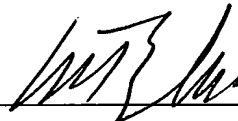
- GREAT BRITAIN Patent Application No. 0227199.7 filed 11/21/2002.

Respectfully submitted,

Date October 31, 2003

HEWLETT-PACKARD  
Customer Number: 22879

By



William T. Ellis  
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Registration No. 26,874



INVESTOR IN PEOPLE

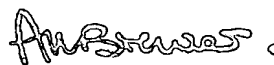
The Patent Office  
Concept House  
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NP10 8QQ

I, the undersigned, being an officer duly authorised in accordance with Section 74(1) and (4) of the Deregulation & Contracting Out Act 1994, to sign and issue certificates on behalf of the Comptroller-General, hereby certify that annexed hereto is a true copy of the documents as originally filed in connection with the patent application identified therein.

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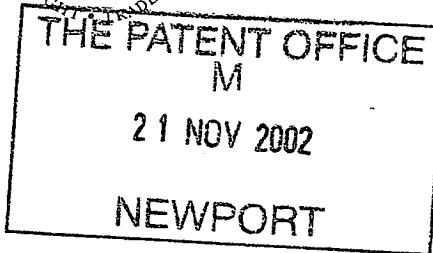
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P01/7700 0.00-0227199.7

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# Request for grant of a patent

(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)

1. Your reference	300203673-1 GB		
2. Patent application number (The Patent Office will fill in this p	0227199.7	21 NOV 2002	
3. Full name, address and postcode of the or of each applicant (underline all surnames)	Hewlett-Packard Company 3000 Hanover Street Palo Alto CA 94304, USA  Patents ADP number (if you know it) Delaware, USA If the applicant is a corporate body, give the country/state of its incorporation		
4. Title of the invention	Apparatus for Printing and Memory Tag Application and Method Therefor		
5. Name of your agent (if you have one)	Richard A. Lawrence Hewlett-Packard Ltd, IP Section Filton Road, Stoke Gifford Bristol BS34 8QZ		
"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)			
Patents ADP number (if you know it)	0744 803 8001		
6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and (if you know it) the or each application number	Country	Priority application number (if you know it)	Date of filing (day / month / year)
7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application	Number of earlier application	Date of filing (day / month / year)	
8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (Answer 'Yes' if: a) any applicant named in part 3 is not an inventor, or b) there is an inventor who is not named as an applicant, or c) any named applicant is a corporate body. See note (d))	Yes		

Title: Apparatus for Printing and Memory Tag Application and method therefor

5    Field of the Invention

The invention relates to printing apparatus, and in particular to such apparatus which in addition to printing can apply memory tags to the paper or other base medium being printed onto, and to a method of doing so.

10   Background of the Invention

Memory tags in the form of Radio Frequency Identification (RFID) tags are well known in the prior art, and the technology is well established (see for example: RFID Handbook, Klaus Finkenzeller, 1999, John Wiley & Sons). RFID tags come in many forms but all comprise an integrated circuit with  
15   information stored on it and a coil which enables it to be interrogated by a reader which also powers it by means of an inductive (wireless) link. Until recently RFID tags have been quite large, due to the frequency they operate at (13.56MHz) and the size of coil they thus require, and have had very small storage capacities. Such RFID tags have tended to be used in quite simple  
20   applications, such as for file tracking within offices or in place of or in addition to bar codes for product identification and supply chain management.

Much smaller RFID tags have also been developed, operating at various frequencies. For example Hitachi-Maxell have developed "coil-on-chip" technology in which the coil required for the inductive link is on the chip  
25   rather than attached to it. This results in a memory tag in the form of a chip of 2.5mm square, which operates at 13.56MHz. In addition Hitachi has developed a memory tag they call a "mu-chip" which is a chip of 0.4mm square and operates at 2.45GHz.

a memory tag application station where memory tags are removed from the substrate and applied to the base medium as required.

The memory tag application station may include a reciprocating member adapted to apply pressure to the substrate opposite the location of a memory tag pushing the memory tag onto the base medium, thus transferring the memory tag from the substrate to the base medium.

The memory tag dispenser further may further include a data writing station where data is written to the memory tags and which is located such that the substrate passes it shortly before passing the memory tag application station.

The data writing station may also read the memory tags after writing to them to check that the data has written correctly. Alternatively the memory tag dispenser further includes a data check station which the memory tags pass after the data write station and where the memory tags are read and the data checked with that written at the data write station.

Preferably the base medium passes the print head before passing the memory tag dispenser.

The apparatus may be adapted to handle base medium in sheet form which passes through the apparatus, and in particular to handle sheets of paper or like material.

Preferably the base medium passes through the apparatus with a surface towards the print head and the memory tag dispenser, and the printing and the memory tag are applied to that surface.

The print head of the apparatus may conveniently use ink jet technology.

According to a second aspect of the invention there is provided a method of printing onto a base medium and applying a memory tag to the base medium comprising the steps of:

- i) feeding the base medium along a first axis past a print head;
- ii) printing onto the base medium;

Figure 5 is a schematic of the main elements of a third embodiment of apparatus according to the invention from the side; and

Figure 6 is a schematic of a memory tag and data write device as incorporated in any embodiment of the invention.

5

#### Detailed Description of the Preferred Embodiments

Referring to Figures 1 and 2 apparatus 10 for printing and memory tag placement onto a base medium, in this case sheet paper 12, is illustrated. For simplicity only those parts of the apparatus 10 which need to be shown to  
10 describe the invention are illustrated.

The apparatus 10 includes much known technology from the prior art of printers which is not described here. However, the apparatus 10 includes paper feed rollers 14 which are driven to rotate as indicated by arrows R1 to feed the paper sheets 12 through the apparatus 10 along a first axis in the direction  
15 indicated by arrows A1.

The apparatus 10 further includes a print head 16, which in this example is of ink jet form, mounted on a print head carriage 18 which extends across the apparatus 10 substantially perpendicular to the axis A1. The print head 16 is moveable back and forth along the print head carriage 18, in known manner.  
20 Thus the print head 16 is moveable back and forth along a second axis indicated by arrows A2, substantially perpendicular to the axis A1, to enable the print head 16 to access most of the upper surface 12a of the paper sheet 12 as it moves through the apparatus 10, and thus to print anywhere on that accessible area of surface 12a as required.

25 The apparatus 10 also includes a memory tag dispenser 20 which in this embodiment is connected to the print head 16 for movement back and forth along the print head carriage 18 with the print head 16. Thus the memory tag dispenser 20 is moveable back and forth along a third axis indicated by arrows A3, substantially perpendicular to the axis A1, and parallel to the axis A2, to

command signals as required to the mechanics controller 46, which controls all the mechanical operations of the apparatus, (i.e. the paper feed rollers 14, the movement of the print head 16 and memory tag dispenser 20 along the print head carriage 18 and the operation of memory tag dispenser 20), to the print head 16 and to the data write station 38. Thus the paper sheet 12 is fed through the apparatus 10 and has the required information printed on its upper surface 12a. At the same time the required memory tags 24 have the necessary data written to them at the data write station 38 prior to being moved to the tag application station 40 where they are applied to the upper surface 12a of the paper sheet 12 in the required location(s).

The manner of co-ordination of the printing, data writing and tag application processes will depend on a number of factors. If, for example, the memory tags 24 are only to be applied adjacent the top and/or bottom of the paper sheet 12 then the data writing and tag application processes can take place before and/or after the printing. This would avoid the necessity for the printing process to be interrupted, and would make the co-ordination simpler. Further, when implemented with an inkjet printer, which in general requires a pause, after printing has been completed before the paper sheet is ejected, to allow the ink to dry, the data writing and tag application processes could conveniently take place during this pause for memory tags applied adjacent the bottom of the paper sheet.

It is likely that the memory tags 24 will be read in future both by further apparatus which can scan the paper sheet 12 to locate the memory tags 24 and by hand held readers. Thus in order to assist users in the future to locate the memory tags 24 on the paper sheet 12 the memory tags 24 may be applied to the paper sheet 12 on top of printed icons which can be readily identified by users.

Referring now to Figure 6 the basic operation of the memory tags 24 and of the data write station 38 will be described. The memory tag 24 includes an

P1 may be switched on and off, thus altering the power consumed by the memory tag 24 which is then detected as an amplitude modulation of the voltage across the antenna coil L2 of the data write device 38.

5 The apparatus 10 has been described as appropriate for use with paper sheets 12. However, embodiments of the invention may also be constructed for use with other base media, for example paper in fan fold or roll form, other sheet material, or indeed boxes or other packages passing underneath, rather than through the apparatus 10, on some kind of conveyor.

10 The data write station 38 may, in addition to writing the data to the memory tags 24, also conduct a read operation to check that the data has been written successfully before the memory tag 24 is applied to the base medium. Alternatively, particularly if the apparatus 10' is operating at high speed, a separate data check station 50 may be included in apparatus 10', this would be conveniently located between the data write station 38 and the memory tag  
15 application station 40, as shown in figure 4 (where parts common to the apparatus 10 of Figure 1 are like referenced).

A further alternative, for some very limited applications, is for the supply 22 of memory tags 24 to be pre-written with data when loaded into the apparatus 10. Clearly in such embodiments there would be no requirement for  
20 the inclusion of the data write station 38 within the apparatus, and such a simplified apparatus 10'' is shown in Figure 5 (where parts common to the apparatus 10 of Figure 1 are like referenced).

Although the print head 16 is described as being of ink jet form, the invention can be implemented with many different forms of print head and  
25 indeed many different forms of printer. For some forms of printer with moveable print heads it may be appropriate for the tag dispenser to be moveable independently of the print head, rather than these units being connected together for movement as one. The invention may also be implemented in



CLAIMS

1. Apparatus for printing and memory tag application onto a base medium,  
the apparatus having a print head for printing onto the base medium, and  
5 a memory tag dispenser movable relative to the base medium for  
applying memory tags to the base medium.
2. Apparatus according to claim 1 wherein the print head is movable  
relative to the base medium.
- 10 3. Apparatus according to claim 1 or 2 wherein the base medium is moved  
along a first axis through or past the apparatus and the print head if  
moveable moves back and forth along a second axis and the memory tag  
dispenser moves back and forth along a third axis, the second and third  
15 axes being substantially perpendicular to the first axis.
4. Apparatus according to claim 2 or claim 3 as dependent on claim 2  
wherein the print head and memory tag dispenser are connected together  
and move in unison along the second and third axes.
- 20 5. Apparatus according to any one of the preceding claims wherein the  
memory tag dispenser includes a supply of memory tags on a flexible  
substrate and a substrate guide path which takes the substrate past a  
memory tag application station where memory tags are removed from  
25 the substrate and applied to the base medium as required.
6. Apparatus according to claim 5 wherein the memory tag application  
station includes a reciprocating member adapted to apply pressure to the  
substrate opposite the location of a memory tag pushing the memory tag

memory tag dispenser, and the printing and the memory tag are applied to that surface.

14. Apparatus according to any one of the preceding claims wherein the print head uses ink jet technology.
15. A method of printing onto a base medium and applying a memory tag to the base medium comprising the steps of:
- i) feeding the base medium along a first axis past a print head;
  - ii) printing onto the base medium;
  - iii) feeding the base medium past a memory tag dispenser;
  - iv) moving the memory tag dispenser relative to the base medium and applying a memory tag to the base medium at a desired location.
16. A method according to claim 15 wherein it further comprises the step of moving the print head relative to the base medium.
17. A method according to claim 16 wherein the movement of the print head relative to the base medium is along a second axis substantially parallel to the first axis.
18. A method according to any one of claims 15 to 17 wherein the movement of the memory tag dispenser relative to the base medium is along a third axis substantially parallel to the first axis.
19. A method according to any one of claims 15 to 18 wherein it further comprises the step of writing data to the memory tag, prior to applying it to the base medium.

ABSTRACT

Title: Apparatus for Printing and Memory Tag Application

5       Apparatus (10) for printing and memory tag application onto a base  
medium (12) is described. The apparatus (10) includes a print head (16) for  
printing onto the base medium (12), and a memory tag dispenser (20) movable  
relative to the base medium (12) for applying memory tags (24) to the base  
medium (12). The print head (16) may also be moveable relative to the base  
10   medium (12).

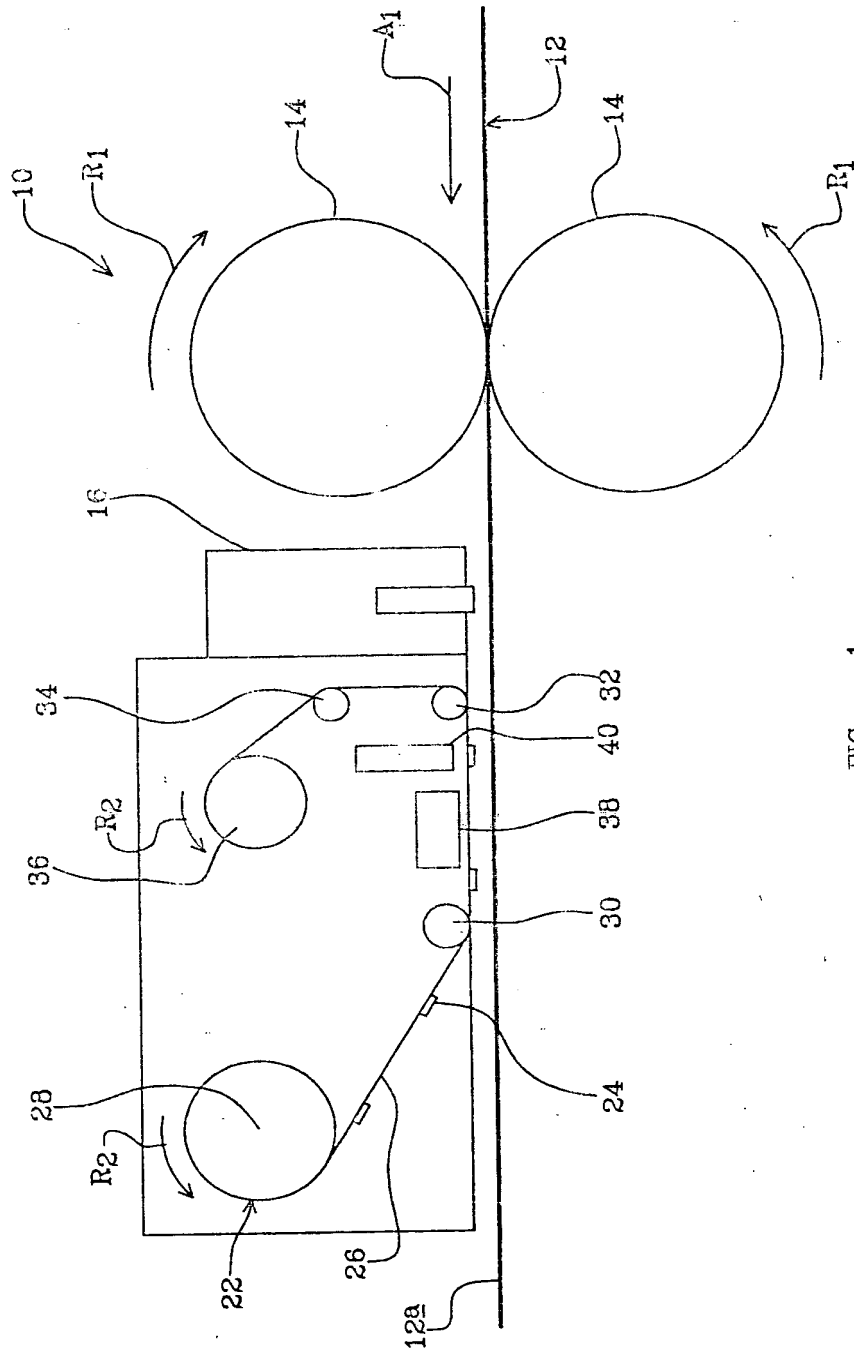
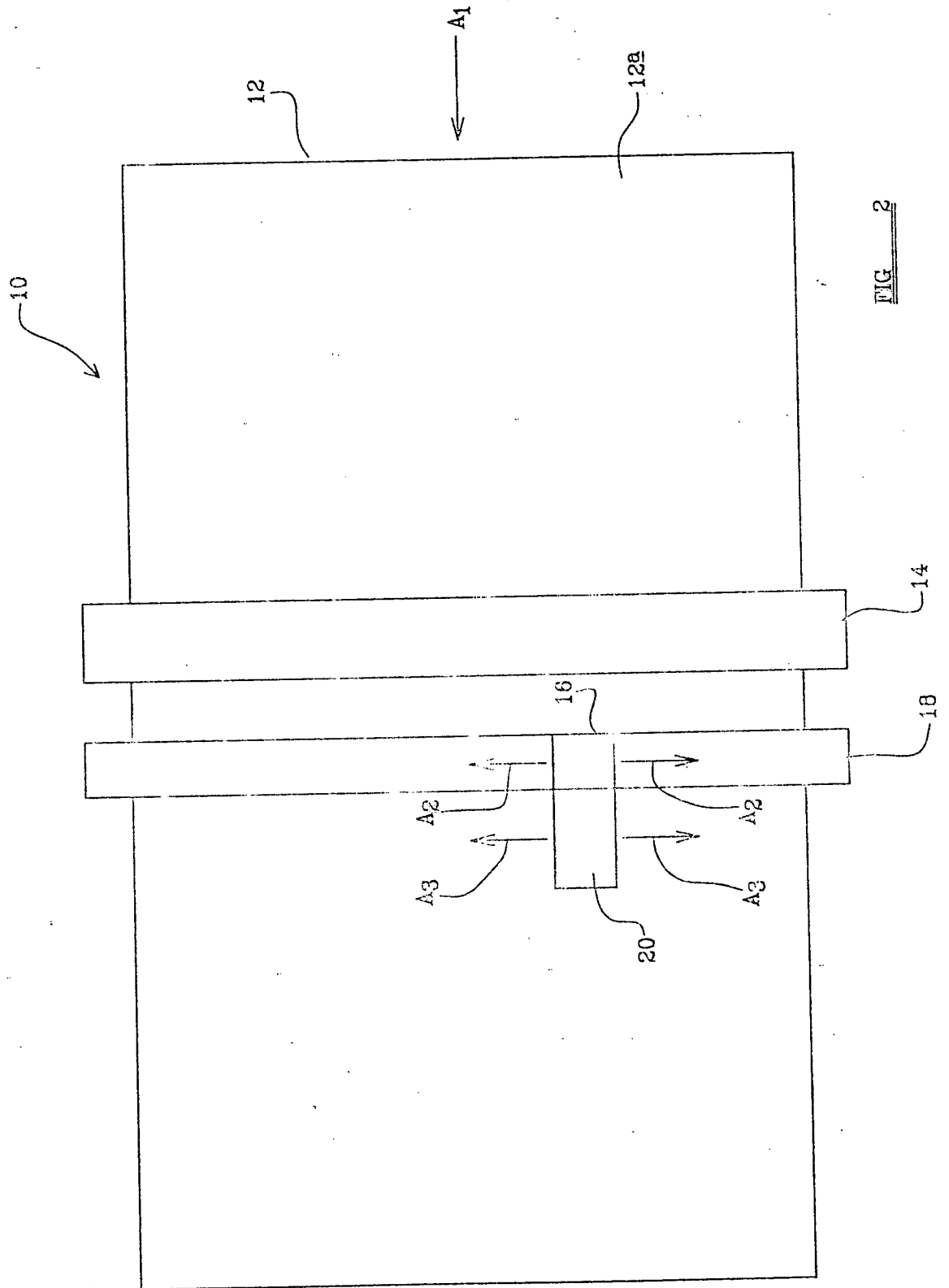


FIG. 1



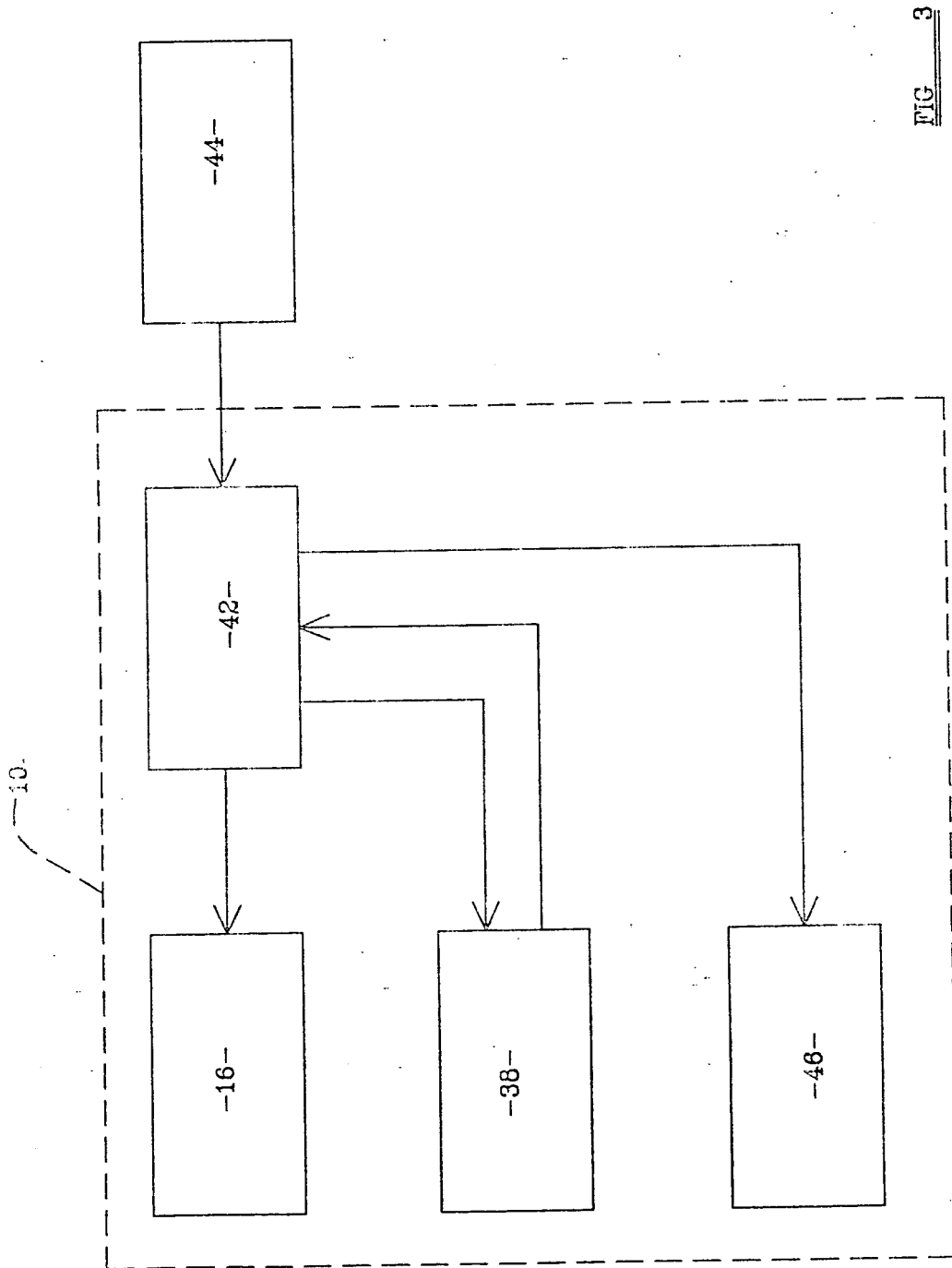


FIG. 3

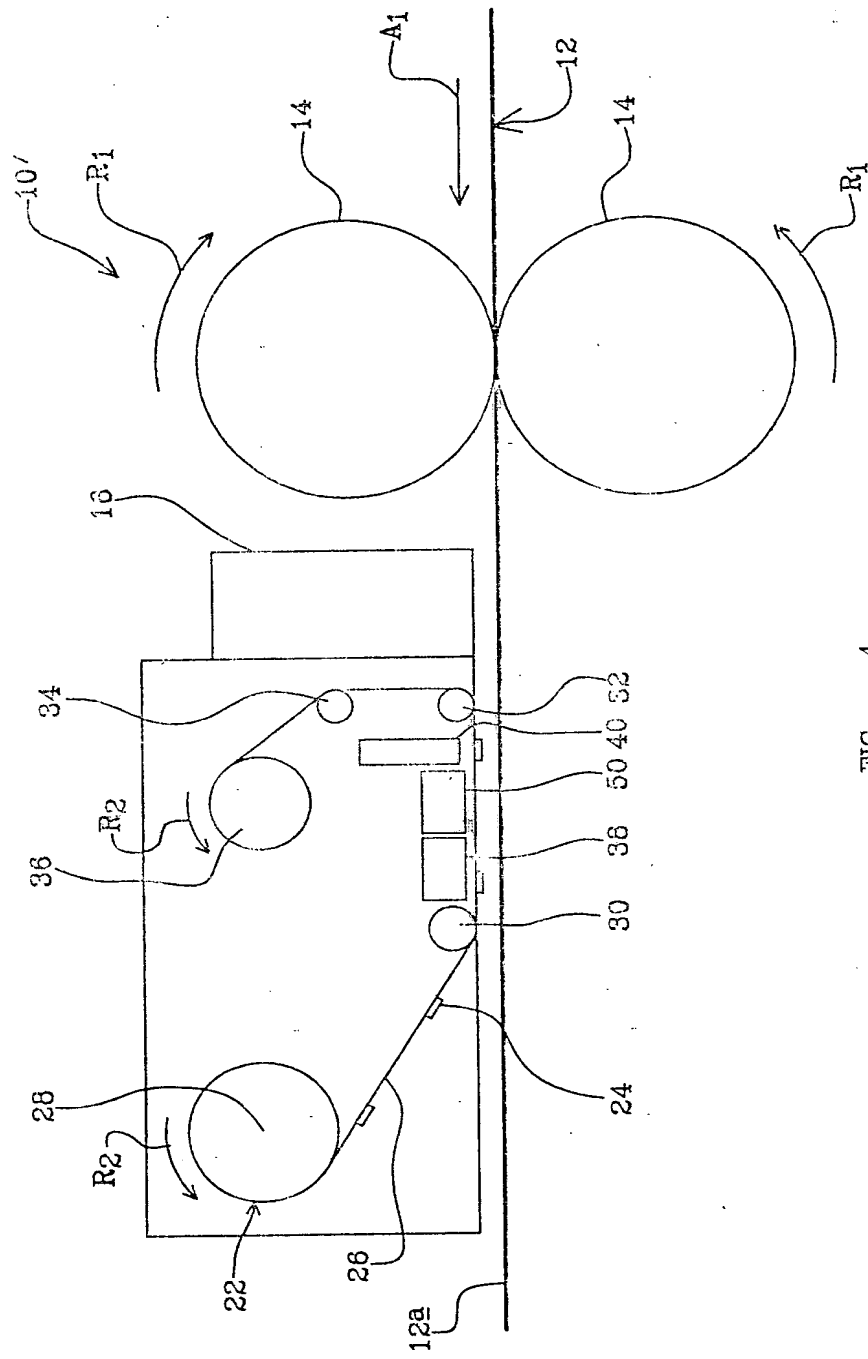


FIG 4

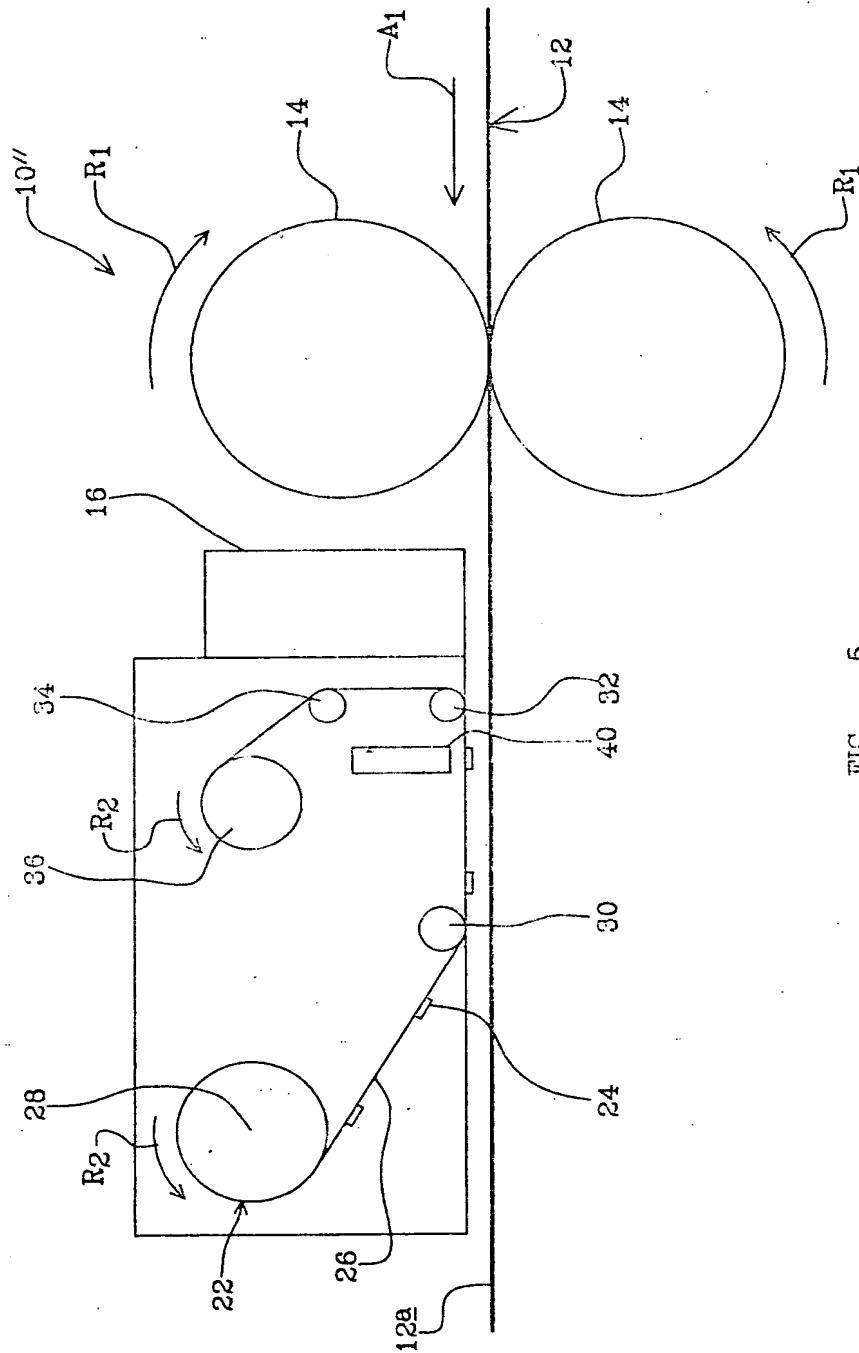


FIG 5



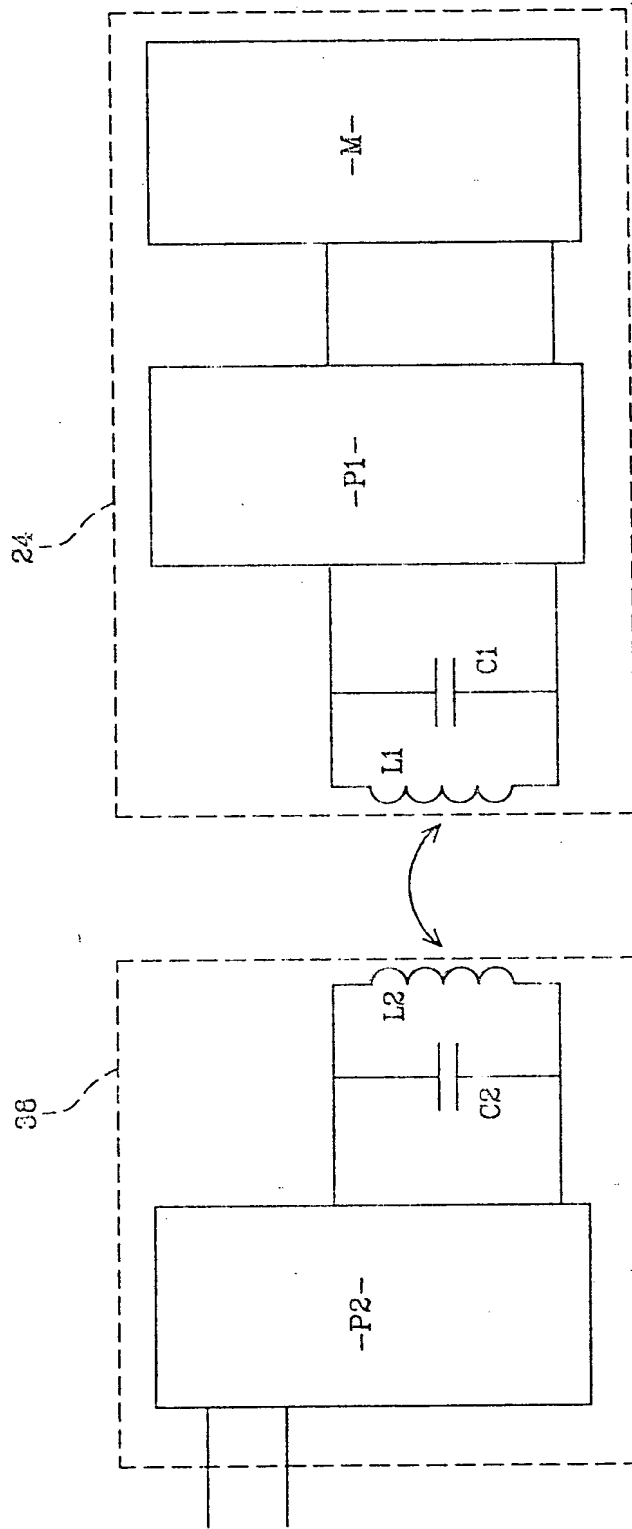


FIG 6